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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.		
10/539,775	08/05/2005	Johannes Schroeter	029368.00035	4993		
4372	7590	05/14/2010	EXAMINER			
ARENT FOX LLP			OCHYLSKI, RYAN M			
1050 CONNECTICUT AVENUE, N.W.			ART UNIT			
SUITE 400			PAPER NUMBER			
WASHINGTON, DC 20036			1791			
NOTIFICATION DATE		DELIVERY MODE				
05/14/2010		ELECTRONIC				

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DCIPDocket@arentfox.com  
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Patent\_Mail@arentfox.com

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/539,775	SCHROETER ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	RYAN OCHYLSKI	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 16 February 2010.  
 2a) This action is **FINAL**.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-17 is/are pending in the application.  
 4a) Of the above claim(s) 12-17 is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-11 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 16 December 2009 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                 | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                        | Paper No(s)/Mail Date. _____ .                                    |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____. | 5) <input type="checkbox"/> Notice of Informal Patent Application |
|   | 6) <input type="checkbox"/> Other: _____ .                        |

## **DETAILED ACTION**

1. This is a non-final Office Action in response to Applicant's Request for Continued Examination of January 7, 2010, which was in reply to a Final Office Action mailed on September 1, 2009. Claims 1 and 11 have been newly-amended and no Claims have been added or canceled.

### ***Continued Examination Under 37 CFR 1.114***

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on December 24, 2009 and February 16, 2010 have been entered.

### ***Claim Objections***

3. Claim 2 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 1 requires the polymer be treated with thermal energy (i.e. heat). Claim 2 recites that thermal

energy/heat is optionally added to the polymer, thereby creating the possibility that Claim 2 does not require a limitation present in Claim 1.

Claim 2 should be revised to either only recite that “heat is removed from the polymer during the method” or Applicant should instead use language such as --wherein the net thermal energy added to the polymer during the method is either positive or negative.--

#### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-11 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The independent claim as written is drawn to polymers as a genus, but Applicant’s disclosure only shows clear possession of the method as it relates specifically to cellulose in a natural fiber form.

The CAFC’s recent opinion in *Ariad Pharmaceuticals, Inc. v. Eli Lilly* explains the problem with such a situation thusly: “For example, a generic claim may define the boundaries of a vast genus of chemical compounds, and yet the question may still remain whether the specification, including original claim language, demonstrates that

the applicant has invented species sufficient to support a claim to a genus. The problem is especially acute with genus claims that use functional language to define the boundaries of a claimed genus."

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claim 1 recites the limitation "electromagnetic radiation having a defined wavelength" in both Lines 2-3 and Line 7. It is unclear if each instance of "a defined wavelength" is intended to be the same wavelength, or if the two wavelengths are intended to be different wavelengths.

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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10. Claims 1-2 and 6-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Fuisz (US 6,129,926 A hereinafter Fuisz).

11. Regarding Claims 1-2 and 6-9, Fuisz teaches a method for the plastic deformation (“thermoplastic polymers [treated] to provide a host thermoplastic material which has altered physical structure” Column 4 Lines 16-19) of polyvinyl alcohol (“polymers (a) and (d)” in Column 10-11, Example 16),

- comprising treating the polyvinyl alcohol simultaneously with pressure and shearing (“shear” Column 4 Line 18, wherein the Examiner considers the shear to necessarily include pressure), the shearing is applied such that a shear rate from  $10^0$  to  $10^6 \text{ s}^{-1}$  acts on the polyvinyl alcohol (“3800 RPM” Column 7 Lines 31-41)
- the pressure and shearing also being applied simultaneously with thermal energy (“subjected simultaneously to a combination of heat and shear” Column 4 Lines 16-19)
- the thermal energy comprising electromagnetic radiation having all defined wavelengths in the range 0.8 to 100  $\mu\text{m}$  and wherein the electromagnetic radiation that was selected comprises a wavelength corresponding to the bond energy of the secondary valency bonds of the polyvinyl alcohol  
(the Examiner notes that since the heat/thermal energy is supplied by a heating element as per Column 7 Lines 31-41, the heat/thermal energy would comprise broad, full-spectrum infrared electromagnetic radiation, which the Examiner understands to comprise the wavelength that corresponds to the bond energy of polyvinyl alcohol's intermolecular bridge bonds),

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- and wherein the method is carried out at a temperature which is below the temperature at which the polyvinyl alcohol melts (polyvinyl alcohol's melting point is 230°C and the maximum possible temperature at which Example 16 is (implicitly) disclosed to be carried out is 221.1°C as per Column 7 Lines 31-41).

### ***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

15. Claims 3-4 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fuisz as applied to Claim 1 above, in view of Tsai et al. (US 6,479,001 B1 hereinafter Tsai), and further in view of Tsai et al. (US 6,479,001 B1 hereinafter Tsai).

16. Regarding Claims 3-4, Fuisz teaches the general method as applied above, but is silent on whether the electromagnetic radiation could be laser radiation.

In analogous art pertaining to polymers, Tsai generally teaches that disrupting secondary valence bonds is thought to provide the benefit of facilitating the movement of polymer chains during shearing events and lowering the melt temperature, thereby reducing the amount of torque needed to provide the desired shearing level (Column 11 Line 62 – Column 12 Line 14), and Pratt further teaches that it is a known and predictable technique to disrupt secondary valence bonds/hydrogen bonds with a laser operating at a wavelength corresponding to the bond energy of the hydrogen bonds (Abstract).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to apply the combined teachings of Tsai and Pratt to Fuisz for the benefit of facilitating the movement of polymer chains during shearing events, thereby reducing the amount of torque needed to provide the desired shearing level.

While this hypothetical combination does not expressly disclose that the laser has a wavelength in the range from 1 to 50  $\mu\text{m}$ , it would have been obvious to one

having ordinary skill in the art at the time of the invention to use such a wavelength, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art (*In re Boesch*). One would have been motivated to use a wavelength in the range from 1 to 50  $\mu\text{m}$  for the benefit of finding the appropriate wavelength corresponding to the polyvinyl alcohol's hydrogen bonding.

17. Regarding Claim 11, Fuisz's product is a thermoplastic polymer, but Fuisz is silent on whether it could be further processed.

In analogous art pertaining to polymers, Tsai shows it to be known and predictable to melt polymer in an extruder (necessarily involving simultaneous shear and pressure) so that the melted polymer is then extruded and spun to give fibers (Column 12 Lines 15-31), and the combination of Tsai and Pratt as discussed above teaches that thermal energy provided as the claimed electromagnetic radiation lowers melt temperature and reduces the required torque.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to treat the hypothetical deformed polymer as discussed above with a known and predictable extruder/fiber-spinning setup, with the addition of the claimed electromagnetic radiation that provides lower melt temperature and reduced torque requirements.

18. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fuisz as applied to Claim 1 above.

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19. Regarding Claim 5, while Fuisz does not expressly teach an amount of pressure acting on the polyvinyl alcohol, it would have been obvious to the skilled artisan to operate in the claimed pressure range for the benefit of balancing the necessary holding force to the polymer without preventing the shearing action from having the desired effect by creating damage from pressure, since it has been held that when the general conditions of a claim have been met, finding the optimum or workable range involves only ordinary skill in the art.

20. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fuisz as applied to Claim 1 above, in view of Eckl et al. (US 6,478,494 B1 hereinafter Eckl).

21. Regarding Claim 10, Fuisz teaches that cellulosics are suitable for his “flash flow” process, but is silent on whether cellulose itself could be used (Column 5 Lines 1-24).

In analogous art pertaining to polymers, Eckl teaches extruding and shape natural polymers (Abstract).

While Eckl, too, is silent on whether cellulose itself is shaped, the combined teachings of Fuisz and Eckl together suggest that cellulose could be substituted into the hypothetical combination with a reasonable expectation of success, since Eckl indicates the shapability of natural polymers, and Fuisz's shaping process utilizes cellulosics, and recognizes that cellulose is a natural polymer.

22. Claims 1-4 and 7-10 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Eckl in view of Tsai and Pratt.

23. Regarding Claims 1-4 and 7-9, Eckl teaches a method for the plastic deformation of polymers, including the polysaccharide chitin which is capable of forming intermolecular hydrogen bridge bonds (as per Column 2 Lines 15-35), comprising simultaneously treating the polymers with pressure and shearing and thermal energy supplied to the polymer, wherein the method is carried out at relatively low temperatures ("It is possible to considerably reduce the extrusion temperatures through adding native oils or waxes which reduce the melting or flow transition regions of the polymers such that the polymer undergoes less thermal loading during processing" Column 2 Lines 61-67, wherein the Examiner considers the extrusion process to simultaneously supply pressure and shearing).

However, Eckl is silent on the whether the additives affect secondary valence bonds of the polymer.

In analogous art pertaining to polymers, the combination of Tsai and Pratt, as discussed above, teaches that a laser having a wavelength corresponding to a polymer's secondary valence bonds allows for lower melt temperatures and lower torque requirements for an extruder.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to apply a laser as per the combination of Tsai and Pratt to Eckl for the benefit of allowing for lower melt temperatures and lower torque requirements for the extruder.

The Examiner additionally notes that such a hypothetical combination would have a region at least near the entrance of the extruder wherein the polymer would be deformed at a temperature at which the polymer melts, since all the conditions believed to be necessary for such a deformation to occur would be present, particularly the condition that Eckl does not cause the polymer to be melted before being added to the extruder (i.e. feeding a solid polymer into an extruder and expelling a melted polymer out of an extruder would involve the polymer at least at some period of time being plastically deformed below its melting point).

However, while this hypothetical combination does not expressly disclose that the laser has a wavelength in the range from 1 to 50 µm, it would have been obvious to one having ordinary skill in the art at the time of the invention to use such a wavelength, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art (*In re Boesch*). One would have been motivated to use a wavelength in the range from 1 to 50 µm for the benefit of finding the appropriate wavelength corresponding to the polymer's hydrogen bonding (as per Pratt, as discussed in the first Claim 3 rejection, above).

24. Regarding Claim 10, while Eckl does not specifically discuss unmodified cellulose as a material that either could or could not be extruded as taught, the Examiner considers that since cellulose is a well-known natural polymer and Eckl's process is designed to handle natural polymers (both facts evidenced by Column 3 Lines 16-24 of Eckl), it would have been obvious to a person having ordinary skill in the

art at the time of the invention to try substituting cellulose for chitin, lignin, or other natural polymers discussed by Eckl. with a reasonable expectation of success, since cellulose is a prominent natural polymer, of which there are a finite number identified.

25. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eckl, Tsai, and Pratt as applied to Claim 1 above, and further in view of Craggs et al. (US 5,095,654 A hereinafter Craggs).

26. Regarding Claim 5, the previous combination teaches the general method as applied above, but is silent on specific pressures acting on the polymer.

In analogous art pertaining to polymer shaping, Craggs teaches that solid phase deformation of comprises applying pressure of  $52.5 \text{ N/mm}^2$  for the benefit of providing enough pressure to ensure a constant haul-off speed (Abstract and Column 6 Lines 7-33).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to apply pressure as taught by Craggs to the previous combination for the benefit of providing enough pressure to ensure a constant haul-off speed and to make adjustments within the claimed range to optimize the amount of pressure needed to extrude Eckl's chitin, if necessary, as per *In re Boesch*.

27. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eckl, Tsai, and Pratt as applied to Claim 1 above, and further in view of Fuisz.

28. Regarding Claim 6, the previous combination teaches the general method as applied above, but is silent on specific shear rates acting on the polymer.

In analogous art pertaining to polymer shaping, Fuisz generally teaches that sufficient shearing applied to a polymer results in a “transformation of physical and/or chemical structure without degradation of the material” and that an appropriate shear rate to achieve this effect is in the range from  $10^0$  to  $10^6$  s<sup>-1</sup> – namely 3600-3800 rpm -- for the above-quoted benefit of transformation without degradation (Abstract and Column 3 Lines 5-15).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to apply shear as taught by Fuisz to the previous combination for the benefit of transforming physical and/or chemical structures without degradation of the material and to make adjustments for the rate of shear needed to achieve this effect in chitin, if necessary, as per *In re Boesch*.

### ***Response to Arguments***

29. Applicant's arguments with respect to Claims 1-11 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

30. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
31. Any inquiry concerning this communication or earlier communications from the examiner should be directed to RYAN OCHYLSKI whose telephone number is 571-270-7009 and whose direct fax number 571-270-8009. The examiner can normally be reached on Monday through Thursday and every other Friday from 9:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Del Sole can be reached on 571-272-1130. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

rmo

/Joseph S. Del Sole/  
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